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Collateral Damage: The Impact of Work Stoppages on Student Performance in Ontario

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- Strikes by, or lockouts of, elementary teachers in Ontario have measurable and significant negative impacts on student performance.
- Grade 6 students are the most affected by strikes, particularly in mathematics, while strikes are less harmful for Grade 3 students.
- The negative effects of stoppages in both Grade 3 and Grade 6 are much stronger at schools where students arrive with social and economic disadvantages that predict lower academic performance.

Between the school years 1998/99 and 2002/03, Ontario experienced 15 elementary teacher strikes or lockouts. They ranged from a one-day stoppage in Thunder Bay Catholic District School Board (DSB) to a 15-day stoppage in York Catholic DSB. Five percent of elementary schools in Ontario experienced a work stoppage at some point over this period. How did these stoppages change student learning outcomes? The answer is important to all involved in childhood education, from parents and teachers, to unions and school boards.[1]

This study concludes that (i) stoppages can be shown to have a strong negative impact on student learning outcomes in Grade 6; (ii) the overall impact of stoppages on Grade 3 pupils appears to be much smaller, perhaps zero, although there is a noticeable, negative effect on achievement in mathematics; and, (iii) work stoppages have much greater adverse effects on students in both Grade 3 and Grade 6 in schools where more students come from disadvantaged backgrounds.[2]

Measuring Student Outcomes in Ontario

This study employs the available provincial data on student performance in grades 3 and 6 as a starting point for analysis. Ontario's Education Quality and Accountability Office (EQAO) reports student learning outcomes in

1 This e-brief highlights some results from Johnson (2009). That paper is available from the author on request.

2 In Johnson (2009), the effects of work stoppages and work-to-rule campaigns are measured using a variety of definitions of stoppage over different periods.

reading, writing and mathematics for Grade 3 and Grade 6 for most provincial schools beginning in 1998/99.[3] To investigate the impact of work stoppages, learning outcomes at schools where stoppages took place are compared with those of socioeconomically similar schools in the same year where stoppages did not take place. There were eight stoppages in 1998/99, three stoppages in 2000/01 and two stoppages in 2002/03.[4]

Work stoppages in Ontario are subject to government intervention according to the *Education Act* (1990), under which an advisory group is empowered to provide an opinion to the government on whether to mandate an end to a stoppage. The criterion for intervention is when a strike or lockout of teachers or board employees will 'jeopardize' the successful completion of courses of study by the affected pupils (Shilton and Schucher 2004). In an elementary setting, jeopardy is extremely difficult to define. Comparing the outcomes in schools that experienced stoppages with those at similar schools that did not can help policymakers, parents and teachers judge when stoppages jeopardize student learning and identify the groups of students most in jeopardy.

For clarity's sake, the central achievement measure in this paper is a straightforward "pass rate": the percentage of students at the school who achieve a Level 3 or Level 4 on EQAO assessments of skills in reading, writing and mathematics in Grade 3 or Grade 6 in each year at each school.[5] A Level 1 or Level 2 test score is considered to show the student as not meeting provincial standards for understanding the Ontario curriculum. The definition of students being in 'jeopardy' used in this paper will be students that go from meeting or exceeding expectations without a stoppage to not meeting the standard after a stoppage. We measure how the percentage of students who pass with a stoppage is different than the percentage of students who pass without a stoppage in a specific year on a specific assessment.

Measures of achievement at the school level are a function of two types of factors: what happens at the school, and what happens outside it. Controlling for this second type – the background of students – is crucial to understanding school-level results. Schools with a large proportion of students from well-educated, affluent and employed parents can be expected to perform above average. Schools with students who arrive at school with significant social and economic disadvantages can be expected to perform worse than average.[6]

The Effect of a Work Stoppage

Tables 1 and 2 show the degree to which each day of work stoppage affects a school's pass rate for each type of assessment, as well as the impact on all assessments averaged together.[7] Each row shows the impact per stoppage-day on the pass rate. Beneath each coefficient is a statistical measure in parentheses that indicates how confident we can be that the effect is not zero; the higher the number, the more certain we are that stoppages have an impact on student performance.[8]

3 If there are fewer than 15 students in a grade in a year, then the school result is suppressed to protect the privacy of students.

4 Since there were no work stoppages after 2002/03, these are the only years for which the analysis can be conducted.

5 The pass rate for each test varied between 40 and 60 percent, depending on the year and the assessment.

6 Johnson (2005) developed a method to separate the influence of socioeconomic factors from the influence of the school and teachers in order to identify schools that outperformed other schools with students from similar backgrounds. The socioeconomic index is based on factors such as education level or income of adults in the area surrounding a school. Details of the estimation methodology and the creation of the socioeconomic index are available in chapters 4 and 6 of Johnson (2005). Thus, the measures accurately capture variation systematic to the school over several years of results and over a large number of students.

7 More formally, a regression equation is estimated separately for Grade 3 and Grade 6 results over all schools in Ontario. In the regression equation is a series of dummy variables for each year and type of assessment as well as a series of social and economic variables for each school. These social and economic variables interact with the dummies by type of test. The details are available in Johnson (2009), the full paper describing this research. The table presents effects of stoppages in the current school year. Johnson (2009) shows these same effects persist to the next school year. The effects are likely a mixture of actual days lost and a result of difficult labour relations in that board. School boards where labour relations lead to stoppages may face other issues that reduce student learning. However, the methodology measures effects that are common across all schools at a large number of boards that experienced a stoppage.

8 The number is 1 minus the probability value on the null hypothesis that the coefficient is zero, expressed as a percent. Thus a probability value of 95 indicates that we expect to be correct 19 times out of 20, that this coefficient is not zero.

Table 1: The Impact of Work Stoppages on Student Achievement, by Assessment

	Effect per day of stoppage on percent of students achieving Level 3 or Level 4	
	Grade 3 (Probability value)	Grade 6 (Probability value)
	percentage point change	
Average of all 3 assessments	-0.03 (55)	**-0.10** (99)
Reading	-0.01 (20)	-0.06 (87)
Writing	-0.011 (1)	-0.02 (82)
Mathematics	-0.05 (69)	**-0.21** (99)

Note: Values that are negative and statistically different from zero with 95 percent confidence level are bolded.
Source: Authors calculations from EQAO.

Table 2: The Impact of Work Stoppages on Student Achievement, Average of all Assessments, by Socioeconomic Quartile

	Effect per day of stoppage on percent of students achieving Level 3 or Level 4	
	Grade 3 (Probability value)	Grade 6 (Probability value)
	percentage point change	
Top quartile	-0.05 (65)	0.01 (22)
Middle two quartiles	**-0.03** (95)	-0.07 (74)
Bottom Quartile	-0.15 (92)	**-0.35** (99)

Note: Values that are negative and statistically different from zero with 95 percent confidence level are bolded.
Source: Authors calculations from EQAO.

The average effect on the pass rate per day of a stoppage in Grade 3 is effectively zero.[9] However, the effects of stoppages vary by type of assessment. The effect of stoppages on reading assessments in Grade 3 is negative 0.01 percentage points, effectively zero. The effect of a stoppage on writing results in Grade 3 is also very close to zero.[10] But the effect on Grade 3 mathematics results is larger, at -0.05, and the statistical indicator is higher at 69 percent. You would be correct 7 in 10 times in asserting a stoppage reduces Grade 3 mathematics results by a small amount per day of stoppage.

The story is dramatically different in Grade 6, and particularly in Grade 6 mathematics. The pass rate in Grade 6 on the average of the three assessment falls by 0.10 percentage points per day of stoppage (the first row of the second column of Table 1). Since the average stoppage is nine days long, the average stoppage is associated with a reduction in pass rates in Grade 6 of about 1 percentage point. Thus, if we accept that not passing the assessment is placing a student in jeopardy, then 1 percent of Grade 6 students are placed in jeopardy after the average stoppage. The drop in the pass rate on the mathematics assessment is 0.21 percentage points per day of the stoppage; that is, about 2 percent of grade 6 students' mathematics education is placed in jeopardy by the average nine-day stoppage.

Information on student background allows us to determine if stoppages affect advantaged and less advantaged students differently. We separate the results into four socioeconomic quartiles based on census characteristics for the students who attend each school and estimate the effect of a stoppage, comparing the top and bottom quartile to middle quartiles (Table 2). The top quartile of schools are the schools that have socioeconomic characteristics that would lead us to expect them to have the top 25 percent of pass rates.[11] The bottom quartile of schools are the schools that have characteristics that would lead us to expect them to have the bottom 25 percent of pass rates. The middle 50 percent of schools are those that fall into neither category.

In both grades 3 and 6, pass rates in schools in the top quartiles are unaffected by stoppages. Pass rates in the middle quartiles in Grade 3 fall by 0.03 percentage points per stoppage-day, while those in Grade 6 fall by 0.07 percentage points per stoppage-day, although the Grade 6 effect is not statistically different from zero. The students in the bottom quartile, however, are strongly affected by stoppages. The effect in Grade 3 is large with a probability measure of 92 percent; that is, if we asserted that stoppages reduce Grade 3 results in the bottom quartile, we would be correct over 9 out of 10 times. The effect in Grade 6 for students in the bottom quartile of schools is quite large, with a drop of 0.35 percent per stoppage-day. In other words, a nine-day stoppage can be expected to lower pass rates in these schools by 3.15 percent.

Conclusion

School work stoppages lower the pass rate on EQAO assessments. The result is much larger in Grade 6 than in Grade 3, much larger on mathematics assessments than on reading and writing assessments and much larger in schools with students who tend to face more serious challenges achieving academic success. Impacts are likely to be similar across other provinces. Thus, this research shows very clearly that in elementary schools the most disadvantaged in society are those hurt most by work stoppages.

Measuring the impact of work stoppages, as done in this study, will provide sobering perspective to all parties in labour disputes in the education system as well as valuable information to government decisionmakers about when and whether to intervene in them.

9 This follows from the value in parentheses of 55 percent. If that value were 95 percent, then we would be correct in concluding that a stoppage has a per-day impact on results, 19 times out of 20, the usual requirement for statistical significance.

10 Technically, the reading value is the base effect and the estimates of the other tests are marginal effects of that test alone. The results reported in Table 1 combine estimated coefficients but the statistical values reflect the base value on reading and the additional effects on writing and mathematics.

11 Quartiles are established using the samples of school without stoppages.

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